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XXVII. *An Account of the Ophidium barbatum LINNEI.* By
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Joseph Banks, Bart. P. R. S.

Read July 5, 1781.

THIS species of fish seems not to have been unknown to the ancients, though probably they confounded it with the *Conger*, to which it bears some resemblance. Perhaps the early Greek and Latin writers on natural history have mentioned it under the name of *Tragus*, or *Callarias*; but for want of descriptions, they left us much in the dark concerning it. PLINY indeed speaks of a fish which appears to be of this species: he calls it *Ophidion**, and as that is the name given to it by all the modern writers, we are obliged to accept his synonymy without further inquiry.

The first author to whom we are indebted for a description and figure of the *Ophidium* is BELLONIUS; yet it appears, that he was not certain of the name of this fish, since he calls it *Gryllus, falso congrus, tragus, aselli species*: nor was he less doubtful of the class to which he should refer it, and therefore placed it among the *Aselli*, or *Gadi*, though very different from the species of that family. RONDELETIUS, who wrote soon after BELLONIUS, has given us a better description, and a more accurate figure of this fish, which he calls *Ophidion*,

* *Ophidion* or *Ophidium*, though the best is *Ophidium*, is not a good generic name, since it is a diminutive from *Ophiς*.

with a reference to PLINY. In the figure of **BELLONIUS** the cirri are very ill represented, and the whole fish appears without any spots, whereas in the plate of **RONDELETIUS** it is covered with oblong spots. This remarkable difference between the figures of these authors was sufficient to determine **GESNERUS**, and others who have written since their time, and who are to be considered rather as compilers than authors, to take the fish described by **BELLONIUS** to be a different species from that of **RONDELETIUS**.

WILLOUGHBY, who is the first ichthyologist who has given us any good description of fish, treats largely of the *Ophidium*; and in his account describes the scales, which are, as we shall hereafter explain, oblong, distinct, and disposed without any regular order. This description was sufficient to ascertain, that the difference between the figures arose from **RONDELETIUS** having drawn the scales omitted by **BELLONIUS**: yet the authors who wrote immediately after WILLOUGHBY, and particularly RAY in his *Synopsis*, follow **GESNERUS**, in maintaining two different species of *cirrata Ophidia*, one with, the other without, spots.

ARTEDI did not take notice of the spots; he describes the fish in a genus to which he gives the name of *Ophidion*, and places that genus among the *Malacopterygii*. After him KLEINUS once more took notice of the spots; but at the same time introduced another confusion concerning this fish, arising from **RONDELETIUS** having said, that it has two cirri, while WILLOUGHBY asserts it has four; but it is easy to reconcile these authors, for though the *Ophidium* has only two cirri, yet each of these being divided in two, they appear as four; so that WILLOUGHBY might justly say, that it is quadri-cirratus. The same author places the *Ophidium* in a genus which he calls

Enchelyopus, which is indeed not a good family, since it comprehends the genera of *Gymnotus*, *Anarrhichas*, *Cepola*, *Blennius*, *Cobitis*, &c.

LINNE in his description of the *Ophidium barbatum* says, that its whole body is covered with oblong spots, without any regular direction. DR. GOUAN, in his description of the genus of the *Ophidium*, does not mention the scales; but gives the spots as a generic character. The last author who has mentioned these spots, and given a description of this fish, is MR. BRUNNICHE in his *Ichthyologia Massilienfis*.

Having adduced the various opinions of the writers on the *Ophidium*, and endeavoured to reconcile their sentiments, we now proceed to give the description of this fish, which is so very remarkable for its singularities. The genus of *Ophidium* has the following principal characters, viz. the body long; the fins of the back, tail, and anus, confounded in one; no fin on the under part of the body; and the eyes covered by the common skin. There are besides many other characters which it is needless to observe here, since I intend not to describe all the species of the genus, but only to mention them. The first species (which is the species of which we are treating) is distinguished by its cirri. The second differs from the former not only by the absence of the cirri, but also by many other marks. ARTEDI, in his account of this species, has adopted the synonymy of SCHONEVELDE, who describes a fish under the name of *Ophidion imberbe flavum*; but this fish, which is the *Blennius gunnellus* LINN. is certainly very different from the *Ophidion imberbe*, LINN. the rays of its dorsal fin being prickly; which circumstance perhaps induced LINNE to place the *Ophidium* among the *Acanthopterygii* in the first editions of his *Systema*, in which he followed the classification of ARTEDI. Perhaps, for the fame

same reason, that author has placed among the *Jugulares* in his *Fauna Suecica*, the species of which we are now speaking. This fish is also very different from the *Sea snail* described by WILLOUGHBY and PETIVER, which is the *Cyclopterus litparis* LINN. though the synonymy of PETIVER has been accepted by GRONOVIVS as being the *Ophidium imberbe**.

LINNE, in the tenth edition of his *Systema*, mentions a third species of *Ophidium*, which he calls *Macrophtalmum*; but afterwards discovered that this species belonged to the genus of *Cepola*. It is another species of this genus which OTHO FABRICIUS has lately described in his *Fauna Grænlandica*, under the denomination of *Ophidium viride*. There are two other fishes, of which GRONOVIVS made a new genus, assigning to it the name of *Mastacembelus*, which comes near to the genus of *Ophidium*, though I am persuaded it constitutes a different one by the presence of the aculei on the back. I shall now proceed to give a description of that species of which I am particularly treating, which I have written in Latin for the sake of perspicuity.

D E S C R I P T I O
O P H I D I I B A R B A T I L I N N.

B. 7. D. 124. P. 20. V. o. A. 115. C. — —.

CAPUT compressum, sub-acutum, nudum, cute communi
laxe tectum.

Rictus amplus.

Mandibula superior duplicata, inferiore paulo lon-
gior.

* The fish mentioned by MR. PENNANT, in the British Zoology, tom. III. append. p. 346. and engraved in the tab. 93. tom. II. under the name of *Ophidium imberbe* LINN. is a species of *Muraena*.

Labia cutacea, tenuia.

Dentes in utriusque maxillæ margine, in aream angustam antice latiusculam dispositi, minuti, acuti, conferti, anteriores paululum maiores.

Lingua subobtusa, glabra.

Palatum medio glabrum, antice areis tribus denticulorum exasperatum, quarum duæ laterales lineares, intermedia subtriangularis.

Fauces superne exasperatæ duabus areis longitudinalibus denticulorum.

Narium foramina utrinque bina, ante oculos posita, distantia; foramine anteriore minore, posteriore nudo.

Oculi supremi, vicini, magni, cute communi tecta: *iris* argentea; *pupilla* lutescens.

Opercula branchiarum cute communi tecta, rotundata polyphylla, mollia.

Membrana branchostega, cute communi tecta, radiis subæqualibus.

Branchiæ quaternæ; tres interiores parte concava gerunt tubercula aspera, separata, in duas series disposita; quarta cæteris longior, latere interno gerit tubercula aspera, externo radios uno latere læviter ferratos.

Cirri duo ad apicem maxillæ inferioris, bipartiti; *lacinia* altera longiore.

Tuberculum subacutum, seu apophysis ossea tecta, recumbens, ante oculos in fronte posita.

CORPUS. Compressum, versus caudam attenuatum.

Linea lateralis suprema, lævis, dorso parallela, vitta argentea subtus ornata.

Squamæ obovatæ, tectæ, umbonatæ, separatae.

Pinna

Pinna dorsalis longa * anali longior sed angustior,
cum caudali continuata, basi sordide albescens, mar-
gine nigra e punctis plurimis nigris: *Radii* sim-
plices, flexiles, molles.

Pinnae pectorales obovatæ, pellucidæ, membrana punctis minutissimis irrorata.

Pinna analis caudali unita, basi albescens, margine nigra, radiis simplicibus.

Pinna caudalis nigra, apice obtusa.

Color capitis et corporis carneo-argenteus.

Lc. : A :: 85 : 35 Lc. : PI :: 85 : 15

Lc. : DI :: 85 : 27 Lc. : PF :: 85 : 22

Lc. : DFCFAF :: 85 : 87 Lc. : AI :: 85 : 37

R. 5². P. 2. D. 2. 3. 4. 5. 6. A. 3. 4. 5. 6.

Before I proceed, I think it necessary to explain the proportional measures which I employed in the foregoing description. ARTEDEI considered the measurement of fishes as necessary to render the description of them perfect; and therefore in the species which he described most completely, we find, he did not fail to express, with the greatest accuracy, the distances between the several parts. He has been followed in this by the best authors who have written upon fishes, as GRONOVIVS and PALLAS. The like practice has been followed by some writers in describing animals of other classes; and particularly by Mr. DAUBENTON, who has, with extraordinary exactness, expressed the measurements of quadrupeds. The use of this measurement, however, can only ascertain that such or such individual is larger or less than another described by an author: for it is impossible by such means to determine a species, and therefore a single measurement, taken from the head to the tail, or in

* Pinna mihi audit longa, cuius basi longitudine excedit radium altiore.

short.

short from any one part to another, would answer the same purpose; but if you take the terms of the measures, and compare them one with another, or all of them to a single one, a method may be deduced for determining the species, and describing each with accuracy, and that is the method which I used.

There is no doubt that fishes have a regular growth, and that all their parts have a proportional increase: it is therefore of no consequence whether the measure be taken from an old or a young subject, it will be always of the same use for determining the species. The term to which I refer all the rest, is taken from the distance between the apex of the upper jaw, and the basis of the fin of the tail. The extremity of the upper jaw is the point from which I take the distance to all the other parts. To determine with more accuracy the junction of the fin to the tail, I incline the fin so as to form an angle with the tail; I take the distances with a pair of compasses, to avoid the irregularities of the surface of the body, which are infinitely various. When I have taken the distance with the compasses, I make a reference to a rule, which is divided in English inches, each of them sub-divided in tenths. To exemplify my practice in a fish of the supposed length of 40 lines from the upper jaw to the tail, and from the same point to the anus of 20 lines, I say, that the distance from the head to the tail compared with the distance from the head to the anus is in this species as 40 to 20, which I express in this manner: Lc. : A :: 40 : 20, which I thus reduce, Lc. : A :: 10 : 5. I then take the length from the upper jaw to the beginning of the dorsal * fin, and to its end: next from

* I measure the dorsal and anal fins at their basis, never in their margin.

the same point to the basis of the pectoral, to its extremity; and in the like manner for the ventral, anal, and tail fins; all which measures I refer to the common term 40. Admitting then the dorsal fin is distant from the upper jaw as ten, I write as before $LC : DI :: 40 : 10$, which I reduce, if I chuse so, $LC : DI :: 20 : 5$.

I take the measures in length only, and never in breadth or depth, because such measures, on many accounts, for instance, from the quantity of spawn, from that of food in the ventricle, &c. would be uncertain; besides there are terms enough afforded by the situation of the anus and the fins. I pay no regard to the measure of the nostrils, of the eyes, &c. as these parts lie too near the extremity of the upper jaw to admit of a sufficient accuracy in their measure. All these distances are written in the shortest manner possible; I therefore do not go into the inquiry what class of the LINNÆAN system the fish described may belong to; or whether the anal fin is before or behind the region of the dorsal; whether the pectoral are extended beyond the ventral; or the tail is forked or not; and many other particulars which could not be expressed but by a very long description, tedious both to the writer and reader.

To make an application of the proportional measurements, I suppose a fish, of a species described, to be in length 40 lines, and from the upper jaw to the anus 10; I take a specimen which I suspect to be of the same species, but which I wish to determine with certainty: the length of it is 20 lines; then I say 40 is to 10 as 20 is to another term, which I discover by multiplying 20 by 10, and dividing the product by 40, which will produce 5, the number of the lines comprehended between the upper jaw and the anus, if the fish be of the species
it

it is thought to be. I proceed in the like manner, in comparing the terms of the measures of the other parts; but the utility of these measures is very apparent in the distinguishing of the species of some genera which are so natural as that of *Cyprinus*, *Clupea*, and many others, of which the species could not be otherwise easily distinguished. I shall instance a species of *Perca* described in the *Commentarii Petropolitani* under the name of *Perca acerina*, by Mr. GUELDENSTAEDT, which could not have been distinguished from the *Perca cernua* but by the proportional measures; since the *Cernua* has the body about three times longer than the head, whereas the *Acerina* has it but twice as long, though by the other characters they are almost indistinguishable.

To express the position of the fins briefly, and with all possible accuracy, which, however, I think may be very well understood by the described measures, I take the distance from the upper jaw to the basis of the pectoral fin, and then see into how many equal parts the whole body may be divided, and to these parts I apply the name of regions; I measure them to the extremity of the middle of the fin of the tail, and I express the position of the fins as follow: D. 3. 4. A. 3. V. 2. P. 2. the letters being the initials of the fins, and the numbers of the regions, the first being from the head to the pectoral fin *.

The scales of the *Ophidium*, which have been figured by RONDELETIUS, but overlooked by many other writers, have

* I beg pardon for the digression; but I thought it would not be improper in this place to observe, that the utility of this method of measurement will appear not only in distinguishing fishes, but also animals of other classes, and particularly snakes, which cannot be well determined otherwise. Besides, I do not know any author on subjects of natural history, who has adopted that method.

been mentioned by WILLOUGHBY, but without any particular description. They are very different from those on the skin of the *Ophidium imberbe*, which are shortly described by GRONOVIVS. Their position, as may be seen in the figure, is irregular. They are dispersed over the whole body. Their form is sometimes round, sometimes nearly oval. They are larger near the head, and in the lower part of the body ; but are hardly to be distinguished near the tail. They adhere to the body by means of a particular transparent skin, which is in general very thin, but somewhat thicker near the neck, and extended loosely over the whole head : this skin is very easily destroyed, after which the scales falling, the body appears spotted (fig. 1.). These scales are of the same sort as those that LEEUWENHOEK has described on the eel, like those I have seen on the *Anarrhichas lupus*, the *Blennius viviparus*, and many other fishes, which are commonly thought to be without scales. When you look at them with the naked eye (fig. 2.) they appear as covered with very small grains ; but viewed through a microscope (fig. 3.) the middle of them appears more elevated than the margin ; and from the center to the margin, close by each other, there are many lines or rays, formed by small scales placed one upon another, like tiles upon a roof, the superior being always the nearer to the center. This sort of scales, which may be called *umbonata*, are fastened to the body by very small vessels which are inserted in their middle ; they are to be seen on the body only, not on the head nor the fins.

I shall now proceed to the anatomy of this fish, which certainly comprehends some very remarkable circumstances, which, I believe, have not yet been observed in any other species. When we have drawn off the skin there appears a thin membrane of a silver colour, which covers the muscles. The

muscles being removed, we find the peritoneum, which lines the abdominal cavity, and is adherent to the swimming bladder by some elongations. It is of a silver hue, with some very small black points. The ventricle is not to be distinguished from the intestines by any other mark but by its size: its form is oblong; it is extended almost to the anus, from whence the intestinal duct has a retrograde course, and then descends again, having a little dilatation near the anus. On the vertebræ next the anus on the outside of the peritoneum is a kind of cavity of an oblong form, containing a reddish viscus, which I take to be the kidney.

The first vertebra from the head has nothing very remarkable in its structure. The second has on each side an elongated and sharp apophysis, to the apex of which is annexed a small ligament. The third is very flat, and has on each side a kind of triangular and sharp apophysis, to which adheres a ligament as to the second. The fourth is remarkable in having a sharp apophysis on each side, articulated with the body of the vertebra, and under each of them, is another articulated apophysis, flattish, thick, roundish at its extremities, and forked at its basis (fig. 5.). The fifth, which is strongly adherent to the former, has in its middle a bifid process. The sixth has in its middle a flattish elevation, sharp on each side. Between the extremity of the larger apophysis of the fourth vertebra, is a bone, or rather a hard cartilage, which bears the figure of a kidney (fig. 6.) its convexity being turned towards the body of the vertebra: its position is parallel to the bodies of the vertebræ; its motion is half circular; one of its parts, *viz.* the lowest, being in the cavity of the swimming bladder, to which it adheres by a thin membrane, so that no air can escape at that part. It is covered by membranes, which adhere strongly to its middle, in this part are fastened the two ligaments.

ments of the apophysis of the second and third vertebræ, of which we spoke before, and which are of a great tenuity. In the same point are fastened also two ligaments each of which belongs to an oblong muscle parallel to each other, and fixed to the bones of the lowest and posterior part of the head (fig. 4.).

All this apparatus is certainly subservient to the purpose of swimming, I suppose, by the cavity of the bladder being made larger or less by the motions of the cartilaginous bone; but it is very remarkable, that if these parts are necessary to some animal function, they should not be found in all the individuals; for I have seen two, of which the vertebræ were not different from the vertebræ of the other species: which difference depends, perhaps, on the difference of sex. I am inclined to believe so; but the generation in this fish seems to be no less mysterious than that of the eel: I could never distinguish a male from a female in this species. I do not know if the other species of *Ophidium* have the same structure; I could not perceive it in some specimens of *Mastacembelus*. WILLOUGHBY mentions that singular structure, but without any particular description.

This fish commonly grows to the size of eight or nine inches. It is to be found in all the Mediterranean Sea, and in great plenty in the Adriatic. It is taken by nets in Provence and Languedoc, together with many other small species, which are not esteemed, that is, what they call *Ravaillâ*. It is often confounded with the *Cepola* by the fishermen, though they have different names for each species. In Languedoc the *Ophidium* is called *Donzellâ*, and the *Cepola*, *flammâ*. In Provence the former has the name of *Corrudgiaö*, and the latter that of *Rougeollâ*. But the name of *Donzellâ*, very common on all the coast of the Mediterranean, is also applied to the *Cepola*, and the *Sparus julis*.

LINN. which, however, is commonly called *girellā*. In summer the *ophidium* is more common: its flesh is not of a good taste, rather coarse, as that of all the species of fishes, which having no ventral fins, are obliged to make great efforts in swimming, and have consequently the muscles harder. The want of ventral fins induces me to believe, that it is not a migratory species. It feeds upon small crabs and fishes.



Fig. 1.

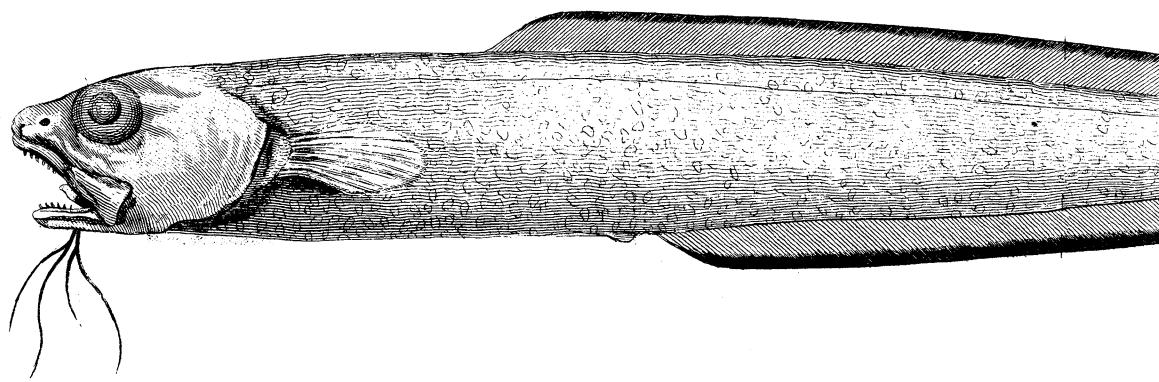


Fig. 4.

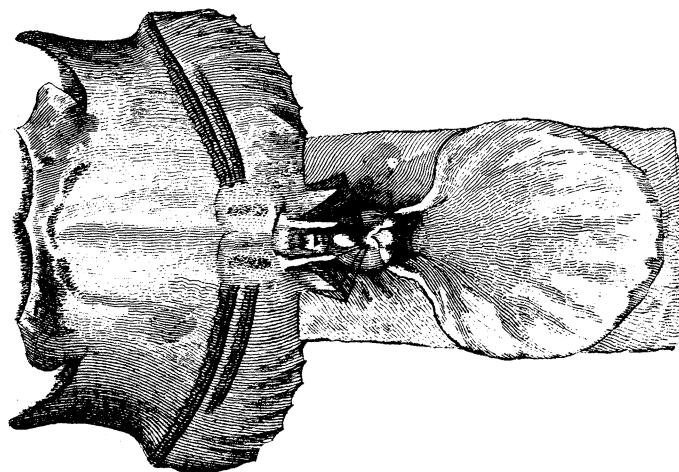


Fig. 5.



Ophidium barbatum Lin

Fig. 1.

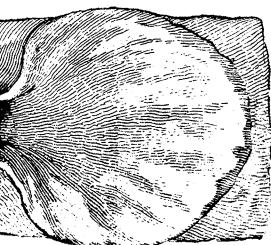
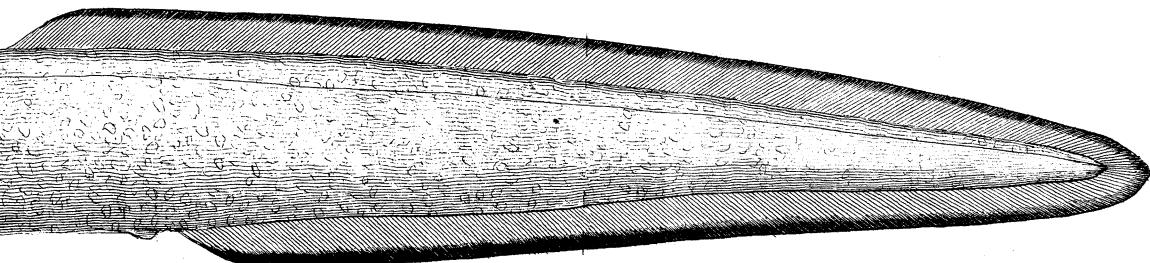


Fig. 5.



Fig. 3.



Fig. 6.



Fig. 2.

Ophidium barbatum Linn.